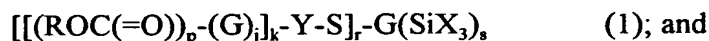


BLOCKED MERCAPTOSILANE COUPLING AGENTS FOR FILLED RUBBERS

ABSTRACT OF THE DISCLOSURE

Disclosed herein is a process of manufacturing a filled rubber comprising the steps of mixing a rubber, an inorganic filler, and a blocked mercaptosilane selected from the group consisting of:



wherein

Y is a polyvalent species $(\text{Q})_z\text{A}(=\text{E})$ selected from the group consisting of
 $-\text{C}(=\text{NR})-$; $-\text{SC}(=\text{NR})-$; $-\text{SC}(=\text{O})-$; $-\text{OC}(=\text{O})-$; $-\text{S}(=\text{O})-$; $-\text{S}(=\text{O})_2-$; $-\text{OS}(=\text{O})_2-$; $(-\text{NR})\text{S}(=\text{O})_2-$;
 $-\text{SS}(=\text{O})-$; $-\text{OS}(=\text{O})-$; $(-\text{NR})\text{S}(=\text{O})-$; $-\text{SS}(=\text{O})_2-$; $(-\text{S})_2\text{P}(=\text{O})-$; $-(\text{S})\text{P}(=\text{O})-$; $-\text{P}(=\text{O})(-)_2$;
 $(-\text{S})_2\text{P}(=\text{S})-$; $-(\text{S})\text{P}(=\text{S})-$; $-\text{P}(=\text{S})(-)_2$; $(-\text{NR})_2\text{P}(=\text{O})-$; $(-\text{NR})(-\text{S})\text{P}(=\text{O})-$; $(-\text{O})(-\text{NR})\text{P}(=\text{O})-$;
 $(-\text{O})(-\text{S})\text{P}(=\text{O})-$; $(-\text{O})_2\text{P}(=\text{O})-$; $-(\text{O})\text{P}(=\text{O})-$; $-(\text{NR})\text{P}(=\text{O})-$; $(-\text{NR})_2\text{P}(=\text{S})-$; $(-\text{NR})(-\text{S})\text{P}(=\text{S})-$;
 $(-\text{O})(-\text{NR})\text{P}(=\text{S})-$; $(-\text{O})(-\text{S})\text{P}(=\text{S})-$; $(-\text{O})_2\text{P}(=\text{S})-$; $-(\text{O})\text{P}(=\text{S})-$; and $-(\text{NR})\text{P}(=\text{S})-$; wherein the
 atom A, attached to the unsaturated heteroatom E, is attached to the sulfur which in turn is
 linked via a group G to the silicon atom,

each R is chosen independently from hydrogen, straight, cyclic, or branched alkyl that may or may not contain unsaturation, alkenyl groups, aryl groups, and aralkyl groups, with each R containing from 1 to 18 carbon atoms,

each G is independently a monovalent or polyvalent group derived by substitution of alkyl, alkenyl, aryl, or aralkyl wherein G can contain from 1 to 18 carbon atoms, with the proviso that G is not such that the blocked mercaptosilane would contain an α,β -unsaturated

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carbonyl that can undergo polymerization reactions, and if G is univalent, G can be a hydrogen atom,

X is independently selected from the group consisting of -Cl, -Br, RO-, RC(=O)O-, R₂C=NO-, R₂NO-, R₂N-, -R, and -(OSiR₂)_i(OSiR₃)_j wherein each R is as above and at least one X is not -R,

p is 0 to 5; r is 1 to 3; z is 0 to 2; q is 0 to 6; a is 0 to 7; b is 1 to 3; j is 0 to 1, but it may be 0 only if p is 1, c is 1 to 6, t is 0 to 5; s is 1 to 3; k is 1 to 2; with the provisos that (I) if A is carbon, sulfur or sulfonyl, then (i) a + b is 2 and (ii) k is 1; (II) if A is phosphorus, then a + b is 3 unless both (i) c is greater than 1 and (ii) b is 1, in which case a is c + 1; and (III) if A is phosphorus, then k is 2, to produce a rubber mixture;

mixing into the rubber mixture (i) a deblocking agent to deblock the blocked mercaptosilane, and (ii) a curing agent; and

allowing the rubber mixture to cure.